Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the matter of	)	
	)	
Amendment of Part 97 of the	)	
Commission's Rules Governing	)	RM-8737
the Amateur Radio Service to	)	
Facilitate Spread Spectrum	)	
Communication	)	

Reply Comments by
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Introduction

I, James E. Mitzlaff, have been licensee of amateur radio station WB9SNR for over 20 years. My main interest has been, and continues to be, experimentation and weak signal operation on the UHF and microwave amateur bands. The majority of my operations to date have involved long distance terrestrial communications using CW and SSB emissions. I am also a principal engineer with a major two-way radio, Cellular, and Personal Communication System (PCS) equipment manufacturer and hold a Master of Science degree in Electrical Engineering. In this role, I have had extensive exposure to the interference issues surrounding the use of spread spectrum in the 850 MHz Cellular and 1.9 GHz PCS frequency bands.

Summary

I have major reservations concerning the Petition for Rule Making, RM-8737, filed by the American Radio Relay League (ARRL) on December 12, 1995. While I strongly support removing many of the technical and administrative obstacles to the use of spread spectrum techniques in the Amateur Radio service, I am concerned that widespread use of spread spectrum without frequency restrictions will cause excessive and unnecessary interference to existing weak signal operations. I therefore recommend that the relaxation of the spread spectrum rules proposed in RM-3787 be accompanied by specific limitations on the frequency bands in which spread spectrum emissions will be allowed. This will protect existing weak signal operations, including EME and satellite communications, from the wide band and high intensity interference that can be produced by a spread spectrum transmitter operating under these proposed rules.

Discussion

The following example will illustrate the interference potential of a single spread spectrum station. Assume that this station radiates a 10 MHz wide spread spectrum signal at a power level of 100 W through an omni-directional antenna. This gives a radiated power spectral density (PSD) of -50 dBW/Hz. In order to avoid significantly degrading the performance of a weak signal receiver, this PSD must be reduced below the ambient noise floor, which is -203 dBW/Hz in a quiet terrestrial location. This means that there must be at least 153 dB of path loss between the spread spectrum station and any other station engaged in weak signal reception. The following table gives the free space distances required to obtain this path loss for several of the major UHF and microwave weak signal operating bands:

Frequency	Distance
432 MHz	2500 km
1296 MHz	820 km
2304 MHz	460 km
10368 MHz	100 km

While free space paths in excess of 100 km are unlikely in purely terrestrial situations, it is quite likely that there will be at least one weak signal station located within 25 km of any spread spectrum station which is located in or near a metropolitan area. It is also quite likely that the path between these two stations will be line-of sight, since both station operators will be highly motivated to place their antennas at the maximum practical elevation in order to get maximum coverage and/or DX capability. The above table can be used to calculate interference levels under these conditions by using the fact that free space path loss varies inversely as the square of the distance between these two stations. For example, at 25 km separation, the spread spectrum interference level will be 40 dB above the ambient noise level at 432 MHz, and will still be 12 dB above ambient at 10 GHz!

The above table also indicates that even a single spread spectrum station can cause harmful interference to receivers on board low-earth-orbit (LEO) Amateur Radio satellites, at least for frequencies below 3 GHz. Given the fact that a typical LEO satellite will have a coverage area on the order of a million sq. km., it is likely that the collective interference arising from widespread use of spread spectrum will virtually disable the satellite. This would cause the loss of an asset valued at anywhere from several $100K to over a million dollars. It would also deprive thousands of Amateur Radio operators of the unique communication services that these satellites provide.

Proposal

It is in the best interests of the Amateur Radio community, and society as a whole, to foster the growth of new modes of communication which may provide benefits which cannot be obtained from the existing technology. Spread spectrum is one such technology which has already proven its worth in the area of secure military communication and has very promising applications in new forms of Cellular and PCS communications. The use of spread spectrum

within the Amateur Radio community, however, has been hindered by burdensome administrative and technical requirements.

While RM-8737 seeks to foster the growth of spread spectrum by removing these burdensome requirements, it does not address the issue of interference between spread spectrum operators and other users of the UHF and microwave spectrum allocated to the Amateur Radio service. If this issue is not addressed, it will inevitably lead to disputes which will continue to delay the widespread acceptance of this new and valuable mode of communication. Given the large amount of spectrum available in the UHF and microwave Amateur bands, these disputes can be easily avoided by protecting existing users through the use of selective frequency allocations for spread spectrum.

In particular, I propose that spread spectrum be authorized only in the following segments of the Amateur Service bands:

905 - 928 MHz
1240 - 1260 MHz
2410 - 2450 MHz
3300 - 3445 MHz
All above 5500 except 5750 - 5770 MHz and 10.360 - 10.380 GHz.

Note that no portion of the 420-450 MHz band has been included in the above list. This is due to the high level of existing activity in this band and the potential for severe interference to both terrestrial and satellite communications described in the preceding section.

These proposed frequencies provide protection for existing weak signal operations near 432, 902, 1296, 2304, 3456, 5760 and 10,368 MHz, as well as amateur satellite operations. At the same time, they provide spread spectrum operators access to over 200 MHz of spectrum in the Amateur bands below 5 GHz, and vastly more spectrum in the higher frequency microwave bands.

Conclusion

I recommend that the Commission incorporate the above frequency allocation plan when formulating new spread spectrum rules designed to foster its widespread use among amateur radio operators. I see no need to place any other restrictions on spread spectrum use, except for regulations, such as spurious emission limits, which already apply to the Amateur Radio service as a whole. I believe that such a course will foster growth of spread spectrum among amateurs and allow them to continue in their historic pursuit of new technologies and the use of higher and higher frequencies, while not disrupting other valuable amateur operation.

Respectfully submitted,

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March 11, 1996